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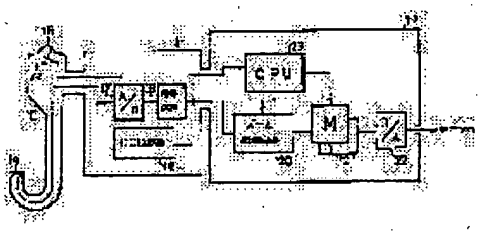
(54) ELECTRONIC ENDOSCOPE HAVING ZOOM FUNCTION

(57)Abstract:
PROBLEM TO BE SOLVED: To increase variation of magnification and to facilitate an operation of selecting the magnification with simple construction.
SOLUTION: This electronic endoscope comprises a CCD 14, a zoom switch 15, a zoom processing circuit 20 for electrically enlarging and displaying an image, a CPU 23, and the like. The CPU 23 controls both of a fixed magnification switching mode for switching a plurality of fixed zoom magnifications and a continuously varying mode for continuously varying zoom magnification. For example, by depressing the zoom switch 15 for short time, the switching operation of the fixed magnification switching mode is executed, and by depressing the zoom switch 15 for predetermined time or longer, the operation of the continuously varying mode is performed. Consequently, since the continuously varying mode can be used in addition to the conventional fixed magnification switching mode, the variation of the magnification is increased.



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CLAIMS

[Claim(s)]
[Claim 1] Electronic endoscope equipment characterized by providing the following The electronic zoom circuit for expanding and displaying a picture electrically 1st scale-factor control means which controls the above-mentioned electronic zoom circuit to become the fixed scale-factor change mode which changes two or more fixed zoom scale factors 2nd scale-factor control means which controls the above-mentioned electronic zoom circuit to become the continuation adjustable mode in which a zoom scale factor is changed continuously The zoom function which was made to perform zoom control including one operation means performed where operation in the above-mentioned fixed scale-factor change mode and operation in the above-mentioned continuation adjustable mode are distinguished in the mode chosen by predetermined operation of the one above-mentioned operation means

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] this invention relates to the content of electronic zoom control of the electronic endoscope equipment which can expand and display the picture of the observed inside of the body.
[0002]
[Description of the Prior Art] Electronic endoscope equipment has CCD (Charge Coupled Device) as an image pck-up element, and can display the picture of the observed inside of the body on a monitor by carrying out the image processing of the picture signal (video signal) acquired by this CCD. In recent years, with this kind of electronic endoscope equipment, what it has an electronic zoom function, and the picture acquired by Above CCD is expanded electrically, and is displayed on a monitor is performed.
[0003] The picture acquired with above equipment is shown in drawing 4 , drawing (A) is the usual picture and drawing (B) is the doubled expansion picture 1.5. In the electronic endoscope as a scope, the zoom switch (push button) is arranged at the control unit etc., and it sets on the monitor 1 of the above-mentioned view (A), and is the picture [usually / (1 time)] P1. 1.5 times as many expansion picture P2 which is a fixed scale factor as shown in drawing (B) when the above-mentioned zoom switch is pushed once and operated in the state where it was displayed as this It is changed. moreover, expansion picture P2 of drawing (B) if the above-mentioned zoom switch is further pushed in the state of a display -- the usual picture P1 of drawing (A) it returns -- ******** -- therefore, the push operation in every time of a zoom switch -- usually -- picture P1 Expansion picture P2 It can choose now by turns.
[0004]
[Problem(s) to be Solved by the Invention] However, in the zoom function of the above-mentioned conventional electronic endoscope equipment, still, there are few variations of a dilation ratio and they are in the situation that a zoom function cannot fully be demonstrated. Then, these people used to presuppose that the zoom function in which a scale factor which is adopted with the VTR camera etc. changes continuously is applied to an endoscope. However, the change method to the fixed scale factor mentioned above also has the advantage that a predetermined expansion picture is immediately observable, and that of utility value being high and omitting this method completely in observation of an endoscope, is not desirable.
[0005] Therefore, it is desirable to form the zoom mode of both methods. However, if the operation which chooses these modes in that case, and the structure for it become complicated, the problem that various kinds of modes formed with much trouble are not used effectively will arise.
[0006] this invention is made in view of the above-mentioned trouble, and the purpose is to offer the electronic endoscope equipment which has the zoom function in which it is easy composition and selection operation in these modes can be performed easily while it forms the zoom mode in which it changes continuously in addition to the conventional zoom function and makes [many] the variation of a dilation ratio.
[0007]
[Means for Solving the Problem] In order to attain the above-mentioned purpose, the electronic endoscope equipment which has a zoom function concerning this invention So that it may become an

electronic zoom circuit for expanding and displaying a picture electrically, and the fixed scale-factor change mode which changes two or more fixed zoom scale factors So that it may become the continuation adjustable mode in which the 1st scale-factor control means and zoom scale factor which controls the above-mentioned electronic zoom circuit are changed continuously One operation means performed where operation in the above-mentioned fixed scale-factor change mode and operation in the above-mentioned continuation adjustable mode are distinguished from the 2nd scale-factor control means which controls the above-mentioned electronic zoom circuit, It is characterized by performing zoom control in the mode chosen by predetermined operation of ****** and the one above-mentioned operation means.

[0008] According to the composition of the operation above, a zoom switch (push button) is formed as one operation means, and control in both fixed scale-factor change mode and continuation adjustable mode is performed by this zoom switch. For example, it is controllable by pushing and operating the above-mentioned zoom switch in short time to shift to continuation adjustable mode from fixed scale-factor mode by performing change operation in fixed scale-factor change mode, and performing push operation twice in continuing pushing more than a predetermined time or a predetermined time.

[0009] Thus, since continuation adjustable mode joins the change mode of the conventional fixed scale factor, the variation of expansion will increase. And since operation in both the modes is distinguished by changing the method of operation of a zoom switch, there is an advantage that zoom control in two kinds of above-mentioned modes is attained with easy composition, and operation of this zoom function also becomes easy.

[0010]

[Embodiments of the Invention] Light equipment etc. is arranged, although the composition of the electronic endoscope equipment which has a zoom function concerning the example of an operation gestalt is shown in drawing 1 , and the electronic endoscope 10 as a scope is connected to processor equipment 12 through a connector area 11 in drawing, in addition not being illustrated. In this electronic endoscope 10, CCD14 which is an image pck-up element is arranged at the point, and the zoom switch (push button switch) 15, the frieze switch, etc. are formed in the control unit.

[0011] The digital disposal circuit 18 which performs predetermined image processings, such as the CCD drive circuit 16 for reading the video signal acquired by the above CCD 14 in the above-mentioned connector area 11, A/D converter 17 which inputs the video signal read from this CCD14, amplification, and clamp processing, is arranged. Moreover, in the above-mentioned processor equipment 12, while performing control control of the zoom processing circuit 20 which carries out expansion processing of the picture, the memory 21 which records a video signal, D/A converter 22, and the whole circuit so that it may become the set-up scale factor, CPU (1st scale-factor control means and 2nd scale-factor control means)23 which performs zoom control based on operation of the above-mentioned zoom switch 15 is formed.

[0012] This CPU23 performs control in the mode which distinguishes and corresponds [whether operation of the above-mentioned zoom switch 15 is operation / which / of fixed scale-factor change mode or continuation adjustable mode], and /. In the initial state of the example of an operation gestalt concerned, it is set up, for example by 1 time (with no expansion) the fixed scale-factor change mode, and by pushing the zoom switch 15 once and operating it ordinarily, it is changed 1.5 times and comes to return 1 time by the next push operation. Moreover, by continuing pushing the zoom switch 15 a predetermined time (for example, 0.5 seconds or 1 second), it shifts to continuation adjustable mode and a scale factor changes from 1 time continuously from 4 times to 1 time conversely up to 4 times according to the push operate time after becoming continuation adjustable mode.

[0013] The data of the operation coefficient table about the scale factor prepared in ROM in the above-mentioned zoom processing circuit 20 (Read-Only Memory) etc. are shown in drawing 2 , and in this example, data, such as a perpendicular (V) direction coefficient, a level (H) direction coefficient, and a pin center,large position, are stored in it about each scale factor from 1 time to 4 times so that it may be illustrated. Therefore, this zoom processing circuit 20 will carry out electronic zoom processing per [which was inputted] video signal by reading the data of the scale factor chosen based on operation of the above-mentioned zoom switch 15 from Above ROM. In addition,

in this zoom processing circuit 20, various kinds of other image processings will also be performed simultaneously.

[0014] The example of an operation gestalt consists of the above composition, and the operation is explained, referring to drawing 3 . First, at Step 101, the control action of CPU23 is shown, and it is judged whether the zoom switch 15 was pushed 0.5 seconds or more, and when it is N (NO), it shifts to Step 102 at drawing 3 . Namely, operation in fixed scale-factor change mode is performed at the time of the push operation for less than 0.5 seconds. In this step 102, it is judged whether the present setting scale factor is except 1 time, when it is N, 1 time (with no expansion) is set up at Step 103, and when it is Y (YES), 1.5 times are set up at Step 104.

[0015] On the other hand, when judged with the zoom switch 15 having been pushed 0.5 seconds or more at the above-mentioned step 101 (Y), it shifts to Step 105 which is continuation adjustable mode, the next scale-factor data of an operation coefficient table are read, and zoom processing is carried out. And at Step 106, it is judged whether this zoom switch 15 is continue being pushed, and when it is Y, it will return to the front step 105. That is, in continuation adjustable mode, the next scale-factor data of the direction where the present setting scale factor to a scale factor becomes high are first read from the inside of ROM. for example, when it was 1 time the present scale factor of this, drawing 2 showed -- as -- one 1.1 times [following] the perpendicular direction coefficient V11 of this, the horizontal coefficient H11, and pin center,large position CO etc. -- data are read and expansion processing (electronic zoom processing) of a video signal is performed in the zoom processing circuit 20 based on these data

[0016] The video signal by which expansion processing was carried out in the above-mentioned zoom processing circuit 20 is the expansion picture P2 as stored in memory 21, and again read after that, and a monitor supplied and shown in the monitor by drawing 4 . It is displayed. In addition, generally, with electronic endoscope equipment, although a still picture can be obtained with a frieze switch, the expansion picture of a still picture can be formed by using the image data in the above-mentioned memory 21 also in this example.

[0017] Here, when the zoom switch 15 continues being further pushed after the scale factor reached 4 times, the scale factor which falls in the 1 time [4 to] as many direction as this conversely is set up (other control is also possible). Moreover, when the zoom switch 15 is pushed in time for 0.5 or less seconds after operation in this continuation adjustable mode was completed, it will be returned 1 time (or 1.5 times) from the present setting scale factor, and will change from continuation adjustable mode to fixed scale-factor change mode.

[0018] Although two fixed scale factors, 1 time and 1.5 times, are prepared in the fixed scale-factor change mode of the above-mentioned example of an operation gestalt, this fixed scale factor is the combination of other scale factors, and is good also as three or more scale factors. Moreover, you may enable it to set it as scale factors other than 4 times also about continuation adjustable mode. Furthermore, although it was made to shift to continuation adjustable mode by continuing pushing more than a predetermined time in the above-mentioned example, you may make it move by operation of performing push operation twice, for example into a predetermined time to continuation adjustable mode also except this.

[0019]

[Effect of the Invention] The 1st scale-factor control means which controls fixed scale-factor change mode which changes two or more fixed zoom scale factors according to this invention as explained above, The 2nd scale-factor control means which controls continuation adjustable mode in which a zoom scale factor is changed continuously, Since it enabled it to choose both the modes in fixed scale-factor change mode and continuation adjustable mode including one operation means to distinguish operation in the above-mentioned fixed scale-factor change mode, and operation in the above-mentioned continuation adjustable mode, and to perform them The variation of a dilation ratio increases and the picture which is easy to observe a specific part etc. can be acquired.

[0020] Moreover, since it enabled it to perform selection operation in these modes with one operation means, an electronic zoom function with many variations can be realized with easy composition, and there is an advantage that moreover operation also becomes easy.

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TECHNICAL FIELD

[The technical field to which invention belongs] this invention relates to the contents of electronic zoom control of the electronic endoscope equipment which can expand and display the picture of the observed inside of the body.

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PRIOR ART

[Description of the Prior Art] Electronic endoscope equipment has CCD (Charge Coupled Device) as an image pck-up element, and can display the picture of the observed inside of the body on a monitor by carrying out the image processing of the picture signal (video signal) acquired by this CCD. In recent years, with this kind of electronic endoscope equipment, what it has an electronic zoom function, and the picture acquired by Above CCD is expanded electrically, and is displayed on a monitor is performed.
[0003] The picture acquired with above equipment is shown in drawing 4 , drawing (A) is the usual picture and drawing (B) is the doubled expansion picture 1.5. In the electronic endoscope as a scope, the zoom switch (push button) is arranged at the control unit etc., and it sets on the monitor 1 of the above-mentioned view (A), and is the picture [usually / (1 time)] P1. 1.5 times as many expansion picture P2 which is a fixed scale factor as shown in drawing (B) when the above-mentioned zoom switch is pushed once and operated in the state where it was displayed as this It is changed. moreover, expansion picture P2 of drawing (B) if the above-mentioned zoom switch is further pushed in the state of a display -- the usual picture P1 of drawing (A) it returns -- ******** -- therefore, the push operation in every time of a zoom switch -- usually -- picture P1 Expansion picture P2 It can choose now by turns.

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EFFECT OF THE INVENTION

[Effect of the Invention] The 1st scale-factor control means which controls fixed scale-factor change mode which changes two or more fixed zoom scale factors by this invention as explained above, The 2nd scale-factor control means which controls continuation adjustable mode in which a zoom scale factor is changed continuously, It enabled it to choose both the modes in fixed scale-factor change mode and continuation adjustable mode including one operation means to distinguish operation in the above-mentioned fixed scale-factor change mode, and operation in the above-mentioned continuation adjustable mode, and to perform them. Therefore, the variation of a dilation ratio increases and the picture which is easy to observe a specific part etc. can be acquired.
[0020] Moreover, since it enabled it to perform selection operation in these modes with one operation means, an electronic zoom function with many variations can be realized with easy composition, and there is an advantage that moreover operation also becomes easy.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, in the zoom function of the above-mentioned conventional electronic endoscope equipment, still, there are few variations of a dilation ratio and they are in the situation that a zoom function cannot fully be demonstrated. Then, these people used to presuppose that the zoom function in which a scale factor which is adopted with the VTR camera etc. changes continuously is applied to an endoscope. However, the change method to the fixed scale factor mentioned above also has the advantage that a predetermined expansion picture is immediately observable, and that of utility value being high and omitting this method completely in observation of an endoscope, is not desirable.
[0005] Therefore, it is desirable to form the zoom mode of both methods. However, if the operation which chooses these modes in that case, and the structure for it become complicated, the problem that various kinds of modes formed with much trouble are not used effectively will arise.
[0006] this invention is made in view of the above-mentioned trouble, and the purpose is to offer the electronic endoscope equipment which has the zoom function in which it is easy composition and selection operation in these modes can be performed easily while it forms the zoom mode in which it changes continuously in addition to the conventional zoom function and makes [many] the variation of a dilation ratio.

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MEANS

[Means for Solving the Problem] In order to attain the above-mentioned purpose, the electronic endoscope equipment which has a zoom function concerning this invention So that it may become an electronic zoom circuit for expanding and displaying a picture electrically, and the fixed scale-factor change mode which changes two or more fixed zoom scale factors So that it may become the continuation adjustable mode in which the 1st scale-factor control means and zoom scale factor which controls the above-mentioned electronic zoom circuit are changed continuously One operation means performed where operation in the above-mentioned fixed scale-factor change mode and operation in the above-mentioned continuation adjustable mode are distinguished from the 2nd scale-factor control means which controls the above-mentioned electronic zoom circuit, It is characterized by performing zoom control in the mode chosen by predetermined operation of ****** and the one above-mentioned operation means.
[0008] According to the composition of the operation above, a zoom switch (push button) is formed as one operation means, and control in both fixed scale-factor change mode and continuation adjustable mode is performed by this zoom switch. For example, it is controllable by pushing and operating the above-mentioned zoom switch in short time to shift to continuation adjustable mode from fixed scale-factor mode by performing change operation in fixed scale-factor change mode, and performing push operation twice in continuing pushing more than a predetermined time or a predetermined time.
[0009] Thus, since continuation adjustable mode joins the change mode of the conventional fixed scale factor, the variation of expansion will increase. And since operation in both the modes is distinguished by changing the method of operation of a zoom switch, there is an advantage that zoom control in two kinds of above-mentioned modes is attained with easy composition, and operation of this zoom function also becomes easy.
[0010]
[Embodiments of the Invention] Light equipment etc. is arranged, although the composition of the electronic endoscope equipment which has a zoom function concerning the example of an operation gestalt is shown in drawing 1 , and the electronic endoscope 10 as a scope is connected to processor equipment 12 through a connector area 11 in drawing, in addition not being illustrated. In this electronic endoscope 10, CCD14 which is an image pck-up element is arranged at the point, and the zoom switch (push button switch) 15, the frieze switch, etc. are formed in the control unit.
[0011] The digital disposal circuit 18 which performs predetermined image processings, such as the CCD drive circuit 16 for reading the video signal acquired by the above CCD 14 in the above-mentioned connector area 11, A/D converter 17 which inputs the video signal read from this CCD14, amplification, and clamp processing, is arranged. Moreover, CPU which performs zoom control based on operation of the above-mentioned zoom switch 15 while performing control control of the memory 21 which records the zoom processing circuit 20 which carries out expansion processing of the picture so that it may become the set-up scale factor, and a video signal in the above-mentioned processor equipment 12, D/A converter 22, and the whole circuit

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the block diagram showing the circuitry of the electronic endoscope equipment which has a zoom function concerning the example of an operation gestalt.
[Drawing 2] It is explanatory drawing showing the scale-factor data used in the zoom processing circuit of drawing 1 .
[Drawing 3] It is the flow chart which shows operation by CPU of the example of an operation gestalt.
[Drawing 4] It is the monitor display screen which shows the zoom function in conventional electronic endoscope equipment, and drawing (A) is in the display state of being 1 time many as this, and drawing (B) is drawing of the enlarged display state of being 1.5 times many as this.
[Description of Notations]
1 -- Monitor
10 -- Electronic Endoscope,
14 -- CCD
15 -- Zoom Switch,
16 -- CCD Drive Circuit,
20 -- Zoom Processing Circuit,
21 -- Memory
23 -- CPU.

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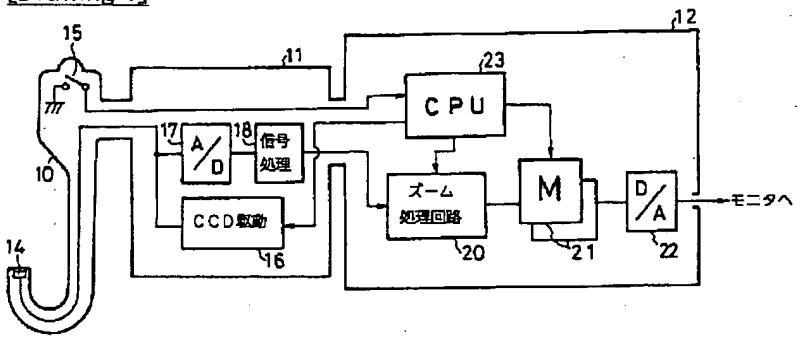
DRAWINGS

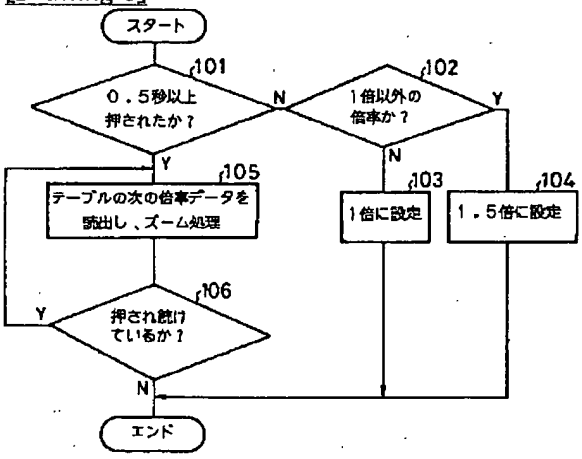
[Drawing 1]



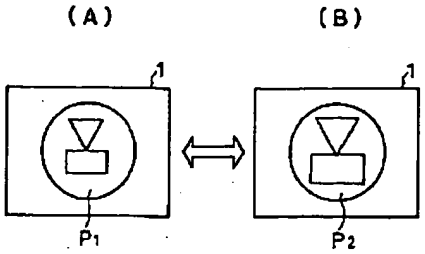
[Drawing 2]

倍率	V(係数)	H	センター位置	その他
1	V10	H10	C0	---
1.1	V11	H11	C0	---
⋮	⋮	⋮	⋮	
2	V20	H20	C2	---
⋮	⋮	⋮	⋮	⋮
4	V40	H40	C4	---

[Drawing 3]



[Drawing 4]



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